

FOREST PEST MANAGEMENT



STATE & PRIVATE FORESTRY

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BIOLOGICAL EVALUATION OF DOUGLAS-FIR BEETLE
DAVIS HILL, BUFFALO RD,
BRIDGER-TETON NF
1985

by
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ACKNOWLEDGEMENT

Appreciation is extended to Allen Dymerski for assistance with field work.

ABSTRACT

Douglas-fir beetle populations have increased in the Davis Hill area of northwest Wyoming since 1981 causing significant tree mortality in large, overmature Douglas-fir. Infestation centers continued to expand rapidly through 1984, however, ground surveys in 1985 revealed a decline in new attacks. This report presents results of the 1985 ground survey of Douglas-fir beetle activity in the Davis Hill Area.

INTRODUCTION

The Douglas-fir beetle (DFB), Dendroctonus pseudotsugae Hopkins, is a destructive insect enemy of Douglas-fir, (Pseudotsuga menziesii [Mirb.] Franco), forests in western North America (Furniss and Orr 1978). Normally it breeds in felled, injured, or diseased trees killing small groups of mature Douglas-fir. Populations most often increase in windfelled or otherwise susceptible trees.

In 1981, fading Douglas-fir were observed along the slope north of the Blackrock Ranger Station, extending east from Davis Hill to Turpin Meadows. A preliminary investigation was conducted in 1983, which indicated increased population levels of DFB in the overmature Douglas-fir stands. Aerial surveys in 1984 revealed a continued spread of the infestation with an estimated 500 attacked trees.

The purpose of this evaluation is to determine the current status of the infestation and recommend management alternatives.

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INTERMOUNTAIN REGION



GENERAL INFORMATION

The seasonal history of the DFB, as with other insects, depends greatly on climatic conditions during the spring and summer months. The DFB has a one year life cycle. The overwintering stage is primarily that of callow adults, but also as larvae. Callow adults mature and emerge in April to early June to attack fresh logs and green trees; whereas the overwintering larvae mature during the spring and attack new trees in June and July. It is not uncommon for adults that attack in the spring to reemerge and make a second brood (Furniss and Carolin 1977, Bedard 1950).

Furniss et al. (1981) identified individual tree susceptibility characteristics as well as those factors which seem to delimit susceptible stands. Trees on which attacks are more dense and successful are those that are older, larger, and more dominant producing more of the attractant resins. Stand characteristics linked with susceptibility are: (1) Density - The denser the stand, the higher the susceptibility; (2) Species Diversity - Mortality groups invariably contain more Douglas-fir than other tree species. Thus, species diversity is a factor in susceptibility with DFB; (3) Stand Age - Average age of most Douglas-fir killed exceeds 120 years. Under some conditions younger trees (80-120 years) can be killed; (4) Disease - There is a positive correlation between endemic Douglas-fir beetle populations and the presence of diseases; and (5) Injury - Injuries such as fire, wind and snow breakage, and defoliation can temporarily render a tree or stand more susceptible to beetle attack.

Appraisals of timber mortality and the trend of an outbreak can be difficult to assess because of the inconspicuousness of the beetle and difficulty in detecting attacks. Indicators of infestation are: (1) orange bark fragments (frass) expelled by the beetles in bark crevices and around the base of the tree, (2) streams of clear pitch exuding from the bole of the tree around the infested areas, (3) reddening of foliage commencing in late summer, or more often the following spring, and (4) evidence of woodpecker activity (Belluschi and Johnson 1969).

During endemic periods, DFB normally attacks small groups of trees damaged by windfall, fire-scorch, or defoliation. Where these conditions are occurring, beetle populations build up rapidly, progressing into adjacent green timber.

METHODS

The survey was conducted June 24-26, 1985, using a systematic variable radius plot (PAF 20) method. Plots were established every 20 chains along a 220 chain transect (Figure 1). Data on all trees were collected at every third plot (volume plots). At the remaining plots (count plots) data were collected on beetle attacked trees with only a basal area count of other trees in the plot.

Fixed-area plots (0.01 acre) were established at each volume plot to measure the amount of regeneration. All trees greater than 6 inches tall and less than 5.0 inches diameter at breast height (DBH) were recorded.

In addition to the variable plot cruises, each infested center was visited and data were collected on the trend of the infestation, (current, last year, and older attacks), were made.





At each center and plot, trees of five inch DBH and larger were classed as follow:

- 0 = green
- 1 = current attack - brood present
- 2 = 1-year-old-attack - brood emerged, red foliage
- 3 = 2 years and older attack - foliage missing
- 4 = unsuccessful attack or pitchout, green foliage
- 5 = strip attack

RESULTS & DISCUSSION

The Davis Hill area is composed of 78 percent Douglas-fir, 11 percent aspen, 7.5 percent lodgepole pine, and 3.5 percent Engelmann spruce. The average DBH for Douglas-fir is 21.1 inches, with the stand age exceeding 120 years. Stand data describe an overmature Douglas-fir stand with heavy Douglas-fir regeneration. These stand attributes are characteristic of high susceptibility to DFB attack. Aerial detection in 1984 and 1985 indicates a decrease in the number of centers and trees killed from DFB. In 1984, 506 trees were reported killed by DFB in some 22 centers, and in 1985, 236 trees were killed in 20 centers.

Field observations detected DFB attacks on 5 percent of the Douglas-fir. The beetle-attacked Douglas-fir were primarily in excess of 20 inches DBH, accounting for approximately 4 percent of the volume. Douglas-fir beetle levels are declining, however, the infestation will continue to cause some mortality to the remaining susceptible Douglas-fir.

ALTERNATIVES

The following alternatives for managing a Douglas-fir beetle infestation are available:

1. Current Action - This alternative would allow the infestation to continue and accept the impacts incurred until the infestation collapses naturally.
2. Direct Suppression - This alternative would involve individual tree treatment. This treatment could be done through removal of infested trees, treating them with a chemical insecticide, or by felling and burning. Individual tree treatment is often expensive and effective only in small infestations. Chemically treated trees could be salvaged at a later date.
3. Sanitation Logging - In this alternative, susceptible green trees would be removed from the stand on a selective basis. This would remove the large diameter trees and reduce the basal area of the stand by changing the green stand structure. This alternative would not be effective by itself in an already infested stand, however, sanitation logging could be used to reduce the susceptibility of an uninfested stand.
4. Salvage Logging - Both currently infested trees and dead trees would be removed. This alternative would utilize the timber resource, as well as suppress the infestations. However, in large areas of infestation, this action may not be practical. This type of logging would not change the characteristics of the stand which lead to the outbreak.





5. Sanitation/Salvage Logging - This alternative combines the removal of dead and infested trees and the susceptible uninfested trees in a stand. This would allow utilization of the timber resource and change the stand structure to reduce the susceptibility of the stand. In extensive areas of infestations, this alternative may not be practical.

6. Trap-tree Method - The trap tree technique involves felling uninfested green trees in or near an infestation. The DFB will aggressively attack available down material. In large infestations, this method may not control a population, but would remove a portion of the DFB population that would attack green standing trees. Large, merchantable trees are cut in the fall or in the spring before DFB flight. Trees should be felled in shaded areas, but not on moist sites where they will sink into the mud; limbs should be left uncut. Once the trap trees have been attacked, they should be removed from the stand within 1 year of date of felling. Trap trees should be cut within 1/4 mile of an accessible road to facilitate removal.

7. Chemical Pheromones - A granular controlled-release formulation of MCH pheromone applied to green and/or green infested stands has shown effectiveness in reducing Douglas-fir beetle-caused mortality (McGregor et al. 1984, Edwards 1982). Ground application of this anti-aggregative pheromone could be applied in and around the infested centers, preventing beetles from breeding in susceptible trees.

RECOMMENDATIONS

Douglas-fir beetle population levels exhibited a significant decline in 1985. However, the stand characteristics remain highly susceptible to DFB attack and some mortality in mature Douglas-fir should be expected. The inaccessibility, aesthetic, and wildlife values of the areas limit some actions.

Short-term Management - At present, no action is recommended for the Davis Hill area. Tree mortality will be minimal in the near future unless significant windthrow occurs to provide breeding sites for DFB. The area should be monitored annually.

Long-term Management - Susceptibility of adjacent uninfested stands should be determined through hazard rating. Stands could then be prioritized for management. Large diameter and overmature trees could be removed to convert stands to a lower level of susceptibility.





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KEY MAP

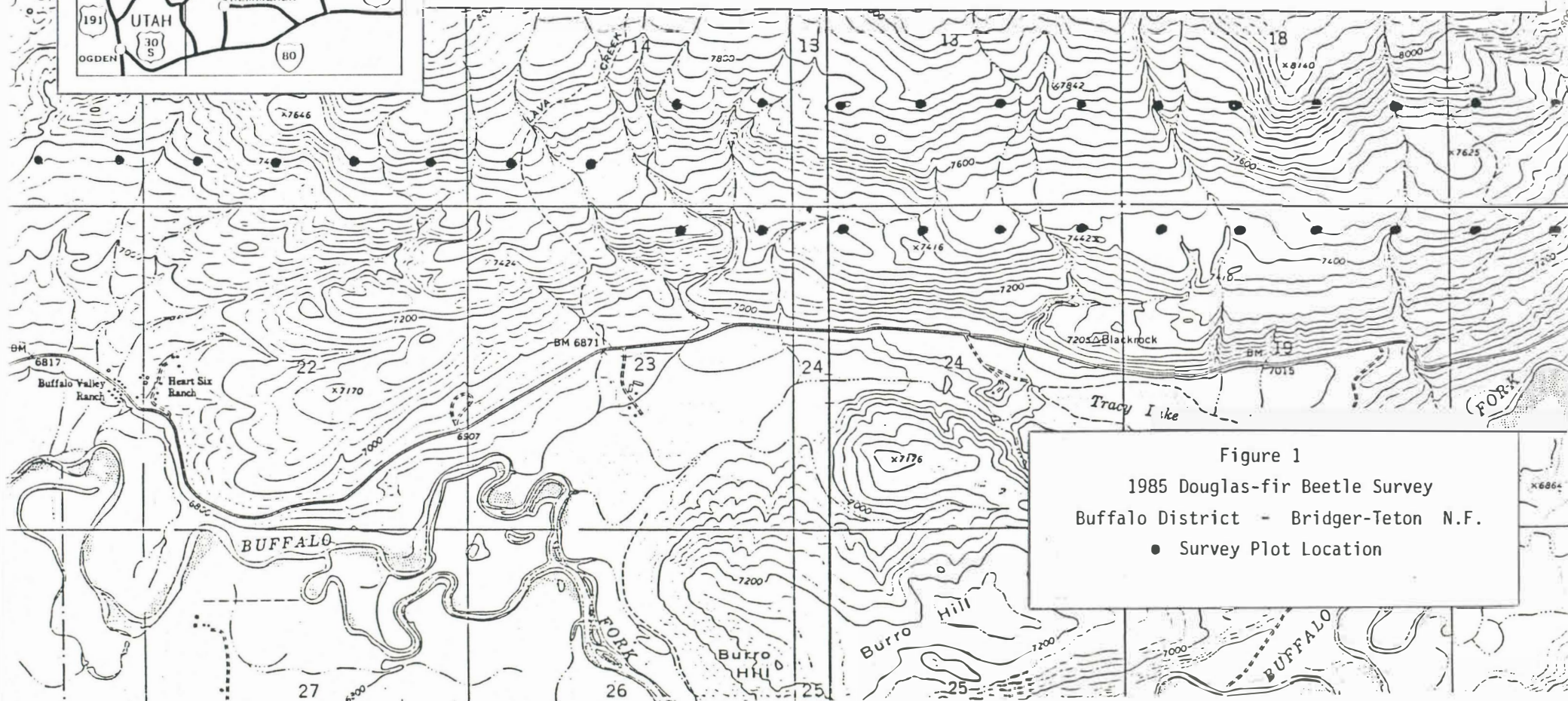
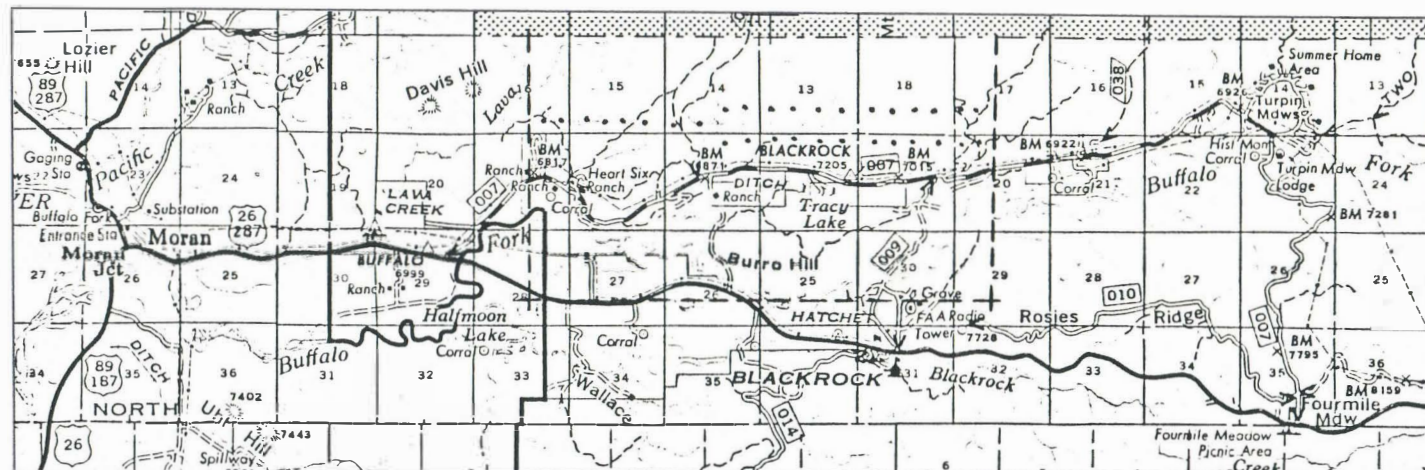
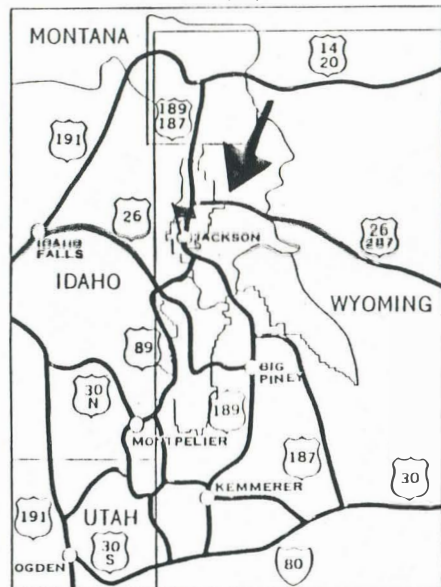


Figure 1
1985 Douglas-fir Beetle Survey
Buffalo District - Bridger-Teton N.F.
● Survey Plot Location



United States
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Agriculture

Forest
Service

R-4

Reply to: 3420

Date: June 10, 1986

Subject: Biological Evaluation of Douglas-fir Beetle
on Davis Hill, Buffalo RD

To: Forest Supervisor, Bridger-Teton NF

Enclosed is an evaluation conducted in the Davis Hill area, Buffalo RD, Bridger-Teton NF. The evaluation provides management recommendations for minimizing tree losses to the Douglas-fir beetle. Basic information on stocking, basal area, and volume losses are provided.

/s/ MAX M. OLLIEU
for

DAVID G. HOLLAND
Ogden Field Representative
Forest Pest Management
State and Private Forestry

Enclosures

cc: (w/encl.)
WO, FPM
Buffalo RD
Kemmerer RD
Big Piney RD
Greys River RD
Jackson RD
Pinedale RD
Wasatch-Cache NF
✓BFO
OFO
S&PF (M. Ollieu)

